



Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Middle Fork Grand River

Water Body Segment at a Glance:

Counties:	Worth/Gentry
Nearby Cities:	Grant City, Gentry and Worth
Length of impaired segment:	25 miles
Pollutant:	Bacteria
Source:	Rural Nonpoint Source
Water Body ID:	0468



State Map Showing Location of Watershed

Scheduled for TMDL development: 2013

Description of the Problem

Beneficial uses of Middle Fork Grand River

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health (Fish Consumption)
- Whole Body Contact Recreation – Category A
- Secondary Contact Recreation
- Irrigation

Use that is impaired

- Whole Body Contact Recreation – Category A

Standards that apply

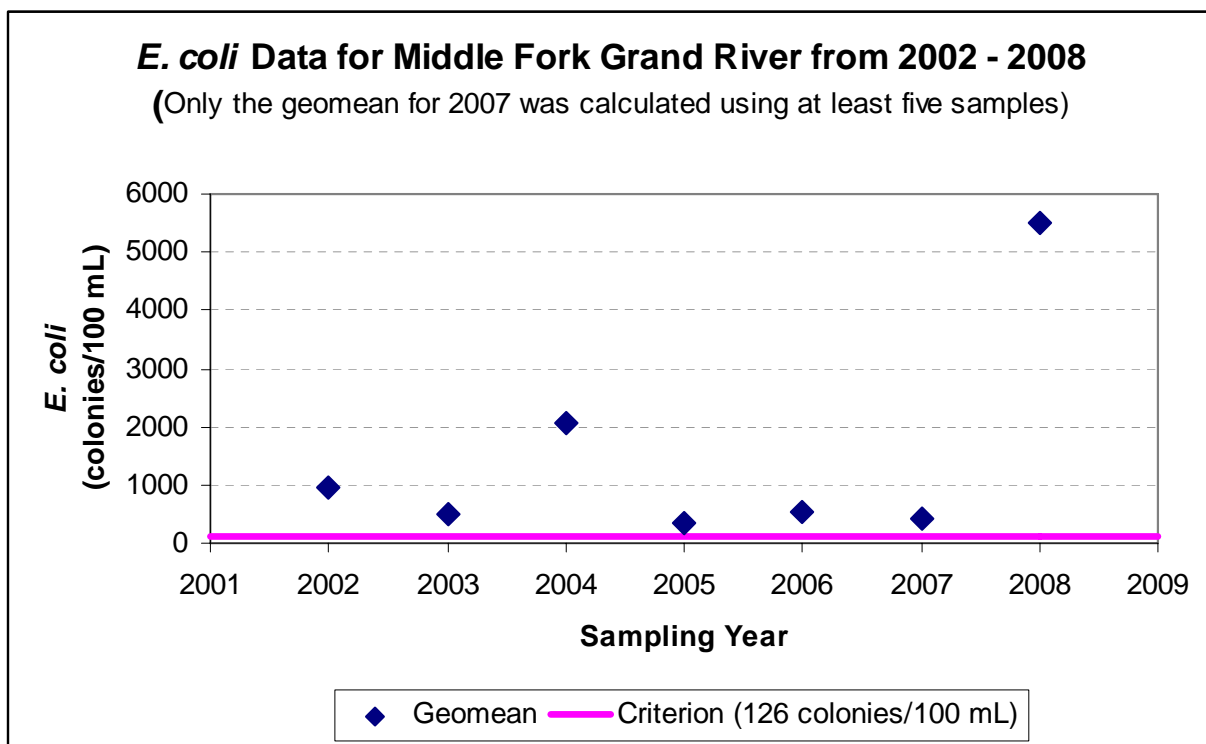
- Missouri's Water Quality Standards at 10 CSR 20-7.031(4)(C) state that the *E. coli* bacteria count shall not exceed 126 colonies per 100 milliliters of water (126 col/100 mL) for Category A and 206 col/100 mL for Category B waters. This count is the geometric mean during the recreational season (April 1- October 31) in waters designated for whole body contact recreation.

Background information and water quality data

The Middle Fork of the Grand River is a northern Missouri prairie stream that flows south to join the Grand River just south of U.S. Highway 136. The river is designated as Category A for the whole body contact recreation use, which means it has swimming areas which are open to and fully accessible by the public.

Excessive amounts of fecal bacteria in surface water used for recreation are an indication of an increased risk of pathogen-induced illness to humans. Infections due to pathogen-contaminated waters include gastrointestinal, respiratory, eye, ear, nose, throat and skin diseases. *E. coli*, are bacteria found in the intestines of warm blooded animals and are used as indicators of the risk of waterborne disease from pathogenic (disease causing) bacteria or viruses. Most *E. coli* strains are harmless, but some can cause serious illness in humans and are occasionally responsible for product recalls. The harmless strains are part of the normal flora of the intestines, and can benefit their hosts by preventing the establishment of pathogenic bacteria within the intestine^{1,2}. Missouri's bacteria criteria are based on specific levels of risk of acute gastrointestinal illness. The levels of risk correlating to these criteria are no more than eight illnesses per 1,000 swimmers in fresh water.

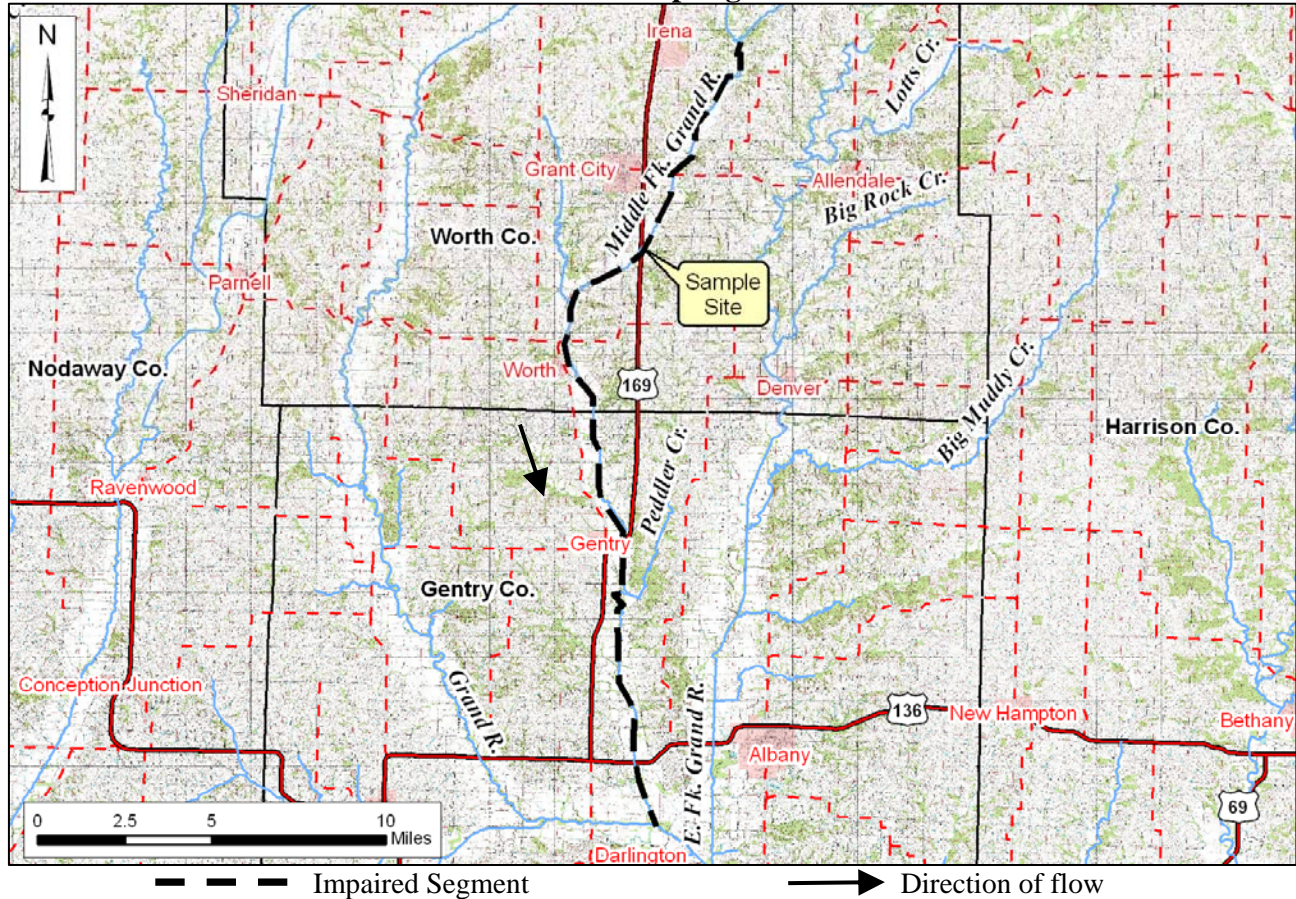
The bacteria impairment in the Middle Fork Grand River is based on data gathered by the U.S. Geological Survey from 2002-2008. The listing methodology states that, to be considered not impaired, a water body must meet the water quality criterion in each of the last three years of available data and that the geometric mean must consist of at least five data points within the recreational season. The geometric mean of the recreational season data exceeded the criterion for *E. coli* of 126 col/100 mL for Category A waters in every year. However, only 2007 had five samples or more and can be used to assess the creek.



¹ Hudault S, Guignot J, Servin AL (July 2001). "[Escherichia coli strains colonising the gastrointestinal tract protect germfree mice against Salmonella typhimurium infection](#)". *Gut* **49** (1): 47–55

² Reid G, Howard J, Gan BS (September 2001). "Can bacterial interference prevent infection?". *Trends Microbiol.* **9** (9): 424–8.

**Map showing Middle Fork Grand River in Worth and Gentry counties, Mo.,
and the sampling site**



Sample Sites
Middle Fork Grand River at U.S. Highway 169

For more information call or write:

Missouri Department of Natural Resources

Water Protection Program

P.O. Box 176, Jefferson City, MO 65102-0176

1-800-361-4827 or 573-751-1300 office

573-522-9920 fax

Program Home Page: www.dnr.mo.gov/env/wpp/index.html